WHAT IS CLAIMED IS:

1. A process for the manufacture of a railroad rail of a steel alloy having a pearlitic microstructure, which rail has a weight of 30 to 100 kg/m, good long-term serviceability, high ductility and high abrasion resistance of the working surface at a rail head, wherein a rail which has a chemical composition in weight % of

carbon (C)	0.4 to 1.0
silicon (Si)	0.1 to 1.2
manganese (Mn)	0.5 to 3.5
chromium (Cr)	up to 1.5,

optionally other alloy elements below 1 weight %, the rest being iron (Fe) and impurities occurring in the manufacturing process, is shaped, during a last pass of a multiple longitudinal rolling, at a reduction rate of 1.8 to 8% and aligned straight in its longitudinal direction at a temperature between 770 °C and 1050 °C, whereafter the rail is mounted in a vertically suspended position with its head down and is allowed to cool slowly in still air to a temperature of 5 to 120 °C above an Ar_3 temperature at a rate of 3 °C/min, and upon reaching this temperature at least the rail head is dipped, in its entire longitudinal extension, into a cooling liquid and is cooled, within a range between 800 °C and 450 °C, with increased cooling intensity and at a rate of 1.6 to 2.4 °C/s, to a temperature of conversion of an austenitic grain microstructure into a fine pearlitic grain microstructure, followed by lifting the rail out of the cooling liquid, placing it onto a cooling bed and allowing it to cool slowly in still air.

2. The process of claim 1, wherein the process results in a railroad rail comprising a rail head having a portion of fine pearlitic grain microstructure and increased hardness of between 340 HB and 425 HB down to a sufficient depth from a top surface, with the remaining rail portions having a hardness which is lower by more than 10 to 40 HB than that

in the head portion, and the arrangement and the size and extension, respectively, of the portion of fine pearlitic grain microstructure and increased hardness in the rail cross section being even along an entire length of the rail.

3. The process of claim 2, wherein a central area at a base of the rail, opposite a web, has a higher hardness than portions in peripheral parts of the base and in the web.

4. The process of claim 2, wherein a hardness in a transition from an upper head portion to a lower head portion and to a web portion decreases continuously.